The accentuation patterns of nominal compounds in Japanese*

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This paper investigates a principled way to account for an observation about accent found in Japanese morphophonology, the so-called short/long distinction in compound accentuation patterns. This paper argues that this seemingly arbitrary distinction is explained in terms of the common notions of prosodic and metrical levels. The different phonological structures of the short and long compounds accounts for the major differences in their patterning with respect to accent, providing a foundation for the descriptive terms short and long. First members of compounds pattern in an unexpected way, given the phonological account proposed. This paper argues that the apparently idiosyncratic patterning of the first member of a compound is a consequence of a Head-Dependent Asymmetry (Dresher and van der Hulst 1998). Japanese compound accentuation patterns thus are far more principled than has previously been thought.

1. Introduction

One of the most characteristic features of Japanese phonology is that it allows a nominal word to appear unaccented:1

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1 All data are from Tokyo Japanese, and this paper focuses only on that dialect of the language. Japanese has relatively rich dialectal variations which are reflected in accentuation patterns, and thus some of the generalizations to be discussed in this paper may not accurately reflect the facts of other dialects. Also, this paper focuses solely on accentuation patterns of nominal items, and the term ‘nominal’ is used in a rather broad sense. I consider a compound to be nominal as long as it functions nominally though a component of
Unaccented Words in Japanese

1. hasi° ‘edge’  
2. kan° ‘intuition’  
3. igirisu° ‘England’  
4. sakana° ‘fish’  
5. gaku° ‘scholarship’  
6. bukkingu° ‘booking’

An unaccented form may contrast with accented forms, giving minimal pairs in terms of accentual status:

Minimal Pairs with Accented and Unaccented Forms

1. hasi° ‘edge’  
2. häsi ‘chopsticks’  
3. hasí ‘bridge’

Japanese nominals are frequently divided into three lexical subclasses, Yamato (native words), Sino-Japanese (old borrowings from Chinese), and Foreign (recent borrowings mainly from Western European languages, which may be distinguished in terms of (un)availability of several phonological characteristics, such as rendaku (also called sequential voicing) (e.g., Itô and Mester, 2003). The unaccented words are not restricted to any specific subclass, but rather their distribution seems to be quite unrestricted. This can be observed in (1); words like hasi° ‘edge’ (1a) and sakana° ‘fish’ (1d) are considered to be Yamato words, ones like kan° ‘intuition’ (1b) and gaku° ‘scholarship’ (1e) are Sino-Japanese, and ones like igirisu° (1g) ‘England’ and bukkingu° ‘booking’ (1h) are foreign.

Similarly, it is observed that some nominal compound words also appear unaccented in Japanese:

Unaccented Compounds

1. kusu-dama° ‘decorated ball’  
2. airurando-go° ‘Irish (Gaelic) language’  
3. yama-neko° ‘wildcat’  
4. biito-ban° ‘kicking board’

Unlike the cases with simple words, where accentedness is essentially a matter of arbitrary lexical specification, several generalizations regarding the unaccented compounds are found. Among these generalizations is the short/long asymmetry.

In studies of Japanese phonology, words are often divided into two classes; short and long (McCawley, 1968). A word is short when it consists of one or two morae, and a

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**Table: Japanese Phonemes**

<table>
<thead>
<tr>
<th>Labial Coronal</th>
<th>Palatal</th>
<th>Dorsal</th>
<th>Laryngeal</th>
<th>Front</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plosive</td>
<td>p b</td>
<td>t d</td>
<td>k g</td>
<td>i u</td>
<td>u (= u)</td>
</tr>
<tr>
<td>Fricative</td>
<td>s z</td>
<td>h</td>
<td></td>
<td>e o</td>
<td></td>
</tr>
<tr>
<td>Nasal</td>
<td>m n</td>
<td></td>
<td>Low</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>Liquids/Approximants</td>
<td>r (= )</td>
<td>y</td>
<td>w</td>
<td></td>
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</tbody>
</table>

The following allophonic roles are observed: /t, d, s, z, h/ are realized as [t e, dz, c, dz, c] preceding the high front vowel /i/. Also, /t, d, h/ are realized as [ts, dz, ð] before the high back vowel /u/. /g/ is often realized as [ŋ] intervocically in Tokyo Japanese. The sequence ɾ, representing palatalized t, has phonetic value of [ð]. See International Phonetic Association (1999) for more details.

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The superscript “°” at the end of a word indicates the word is unaccented.
word is *long* when it contains three or more morae.\(^4\)\(^5\)

<table>
<thead>
<tr>
<th>Short Words</th>
<th>Long Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. <em>ki</em> ‘tree’</td>
<td>f. <em>supeedo</em>(^o) ‘spade’</td>
</tr>
<tr>
<td>b. <em>ti</em> ‘blood’</td>
<td>g. <em>atáma</em> ‘head’</td>
</tr>
<tr>
<td>c. <em>kii</em> ‘key’</td>
<td>h. <em>netto</em>(^o) ‘(Inter)net’</td>
</tr>
<tr>
<td>d. <em>bin</em> ‘bottle’</td>
<td>i. <em>hukuró</em> ‘bag’</td>
</tr>
<tr>
<td>e. <em>kása</em> ‘umbrella’</td>
<td>j. <em>higesóri</em> ‘shaver’</td>
</tr>
</tbody>
</table>

The notion of short and long is also relevant when compounds are considered. A (nominal) compound consists of two (or more) stems:

<table>
<thead>
<tr>
<th>Examples of Compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. <em>maki</em>(^6) ‘roll’ + <em>susi</em> ‘sushi’ → <em>maki-zusi</em>(^7) ‘rolled sushi’</td>
</tr>
<tr>
<td>b. <em>isi</em> ‘stone’ + <em>atáma</em> ‘head’ → <em>isi-atama</em> ‘stone head (bigot)’</td>
</tr>
<tr>
<td>c. <em>kami</em> ‘paper’ + <em>hukuró</em> ‘bag’ → <em>kami-búkuro</em> ‘paper bag’</td>
</tr>
</tbody>
</table>

For the sake of convenience, we will call the first member of a compound *N1*, and the second member of a compound *N2*, and thus the structure of a compound is \([N1] + [N2]\).\(^8\)

A short compound is defined as a compound whose *N2* is short:

<table>
<thead>
<tr>
<th>Short Compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. <em>kare-ki</em> ‘dead tree’</td>
</tr>
<tr>
<td>b. <em>arái-guma</em> ‘raccoon’</td>
</tr>
<tr>
<td>c. <em>airurando-go</em>(^o) ‘Irish (Gaelic) language’</td>
</tr>
</tbody>
</table>

What is crucial here is that the length of the *N1* is irrelevant for defining a short compound. This opacity of the status of *N1* in a compound is clearly illustrated in *airurando-go*\(^o\) ‘Irish (Gaelic) language’ in (6c). Even though the *N1* *airurándo* ‘Ireland’ is clearly long as it consists of six morae, its length is irrelevant to the definition of compound length; this compound is *short* simply by virtue of the *N2* *gó* ‘language’ being short. Similarly, a long compound is a compound whose *N2* is *long*.\(^9\)

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\(^4\) This paper does not consider the cases with *super-long* words, which consists of five or more morae.

\(^5\) This paper follows a relatively standard assumption that both a nucleus vowel and a coda element (i.e., moraic nasal and geminate, as in *kóngo* ‘Congo’ and *néppa* ‘heat wave’) count as moraic. A long vowel, which is represented by a sequence of vowel segments in this paper (e.g., *karee*\(^o\) ‘curry’), counts as two morae. See Yoshida (1990) for an alternative view. Also, note that some sequences of vowels are realized as diphthongs in actual speech (Vance 1987).

\(^6\) The *N1* *maki* ‘roll’ is a derived form of the verb *mak-u* ‘to roll’, and can be further decomposed into the root *mak-* and the (nominalizing) suffix *-i*. Some *N1*s found in this paper are of a similar nature, but this does not interfere with the analysis to be proposed in this paper.

\(^7\) The voicing alternation observed in (5a) is due to the Japanese-specific morpho-phonological process *rendaku*. See Itô and Mester (2003) and references cited therein for details of this phenomenon.

\(^8\) This paper focuses mainly on compounds which consist of two morpho-syntactically simplex ‘roots’. Although some implications are provided in section 3.4.2, any other structurally more complex compounds are generally left aside for future research.

\(^9\) Note that this definition of the term *long compound* differs from the one assumed by Kubozono and
Long Compounds
a. *nama-wásabi* ‘raw wasabi’

b. *kita-ámerika* ‘North America’

c. *kami-kóppu* ‘paper cup’

Once again, the status of the N1 is irrelevant; a compound is *long* as long as its second member consists of three or more morae. Thus, *kami-kóppu* ‘paper cup’ in (7c) is long, even though it contains fewer morae than *airurando-go* ° ‘Irish (Gaelic) language’ in (6c).

Notice that the distinction between *short* and *long* itself is entirely descriptive and arbitrary, and no theoretical foundation is given to why the division is made in such a way. Thus, it remains unclear why there is a boundary between two and three, but not, say, between five and six. Nonetheless, this *short/long* distinction has empirical significance for compound accentuation.

One instance where the *short/long* asymmetry is observed in compound accentuation is in what is called shifted compound accent. While this is not our primary concern in this paper, it is useful to introduce accent shift here since it distinguishes short and long compounds in its patterning. When a compound accent shifts (i.e., is not faithful in position to the N2 accent), it is consistently realized in the rightmost position of the N1 when the N2 is short, while it is realized on the leftmost position of the N2 when the N2 is long:

Short/Long Asymmetry of: Shifted Accent
a. *With Short N2: Accent on N1*
   *takara* ° ‘treasure’ + *húne* ‘boat’ → *takará-bune* ‘treasure boat’

b. *With Long N2: Accent on N2*
   *isi* ° ‘stone’ + *atáma* ‘head’ → *isi-átama* ‘stone head (bigot)’

Kubozono (1995) and Tanaka (2001) argue convincingly that this asymmetry essentially boils down to an interaction between competing constraints on prosodic alignment and extrametricality.

The second *short/long* asymmetry, which is the focus of this paper, concerns unaccented/deaccented cases—*short* compounds may appear unaccented, but *long* compounds may not. No satisfying theoretical explanation has been proposed for this asymmetry to my knowledge. Thus the goal of this paper is to provide a theoretically sound explanation for this asymmetry; more precisely, this paper shows that the apparent *short/long* asymmetry in the status of (un)accentedness is a natural consequence of a prosodic requirement, in that a *long* compound has to mark an accent due to a structural requirement.

This paper follows the following outline. Section 2 provides some descriptive observations which are required for the subsequent section, focusing on the findings around the unaccented compounds. Section 3 provides the core theoretical analysis which accounts for the apparent asymmetry, and argues that the apparent short/long distinction is simply epiphenomenal. This section will also observe that *visibility*-based Head-Dependent asymmetry (Dresher and van der Hulst, 1998) is a necessary component in
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Japanese prosodic phonology. The last subsection of section 3 provides some expected consequences of the analysis I propose in this paper. Finally Section 4 concludes this paper.

This paper is implicitly in line with Optimality Theory (Prince and Smolensky, 1993), to the extent that constraints are an irreducible component of (phonological) grammar of Language although I do not formalize my analysis in Optimality Theory terms. In addition, this paper assumes that resolution of conflicting constraints is accounted for in terms of reranking.

2. Some Observations

Before proposing an account of the short/long asymmetry and accentedness, let us consider what we can say descriptively about compound accents. First of all, compound accent is culminative and idiosyncratic. A compound accent is culminative in the sense that no more than one accent is allowed in a compound. This is shown in (9), as well as in all of the examples provided in this paper so far:

(9) Culminativity of Compound Accent
   a. náma ‘raw’ + wásabi ‘wasabi’ → nama-wásabi ‘raw wasabi’
      but *náma-wásabi
   b. isí ‘stone’ + atáma ‘head’ → isi-átama ‘stone head (bigot)’
      but *isi-átama

A compound accent is idiosyncratic in that it requires some degree of lexical specification. The data in (10) clearly illustrate this point:

(10) Disyllabic Words with Accent on First Syllable
   a. nemurí ‘sleep’ + híme ‘princess’ → nemurí-híme ‘Sleeping Beauty’
      ¶Antepenultimate
   b. awasé ‘blend’ + míso ‘miso’ → awase -míso ‘blended miso’
      ¶Penultimate

What is crucial in (10) is that both compounds have morphologically and prosodically identical structure; in both compounds, N1 consists of three light syllables, and N2 consists of two light syllables, with accent on the initial syllable. Nonetheless, the output forms show different accentuation patterns; an accent shifts to the antepenult position in the case of nemurí-híme ‘Sleeping Beauty’ (10a), whereas an accent occurs in penultimate position of the word in the case of awase-míso ‘blended miso’ (10b). In fact, compounds with híme ‘princess’ as N2 always have an accent in antepenultimate position, while compounds with míso ‘miso’ always carry accent in penultimate position.10 Thus, the correct generalization is that the location of the accent of a compound is determined by its N2. The examples in (11) reinforce this generalization:

10 With exceptions of arguably lexicalized cases, and quadramoaic cases which will be considered later in this paper.
The N1s of the compounds in (11) show different original accentuation patterns—antepenultimate, penultimate\(^{11}\), and unaccented—while all the compounds have the identical N2 kén ‘prefecture’. If there were any impact of the N1 in determining the accentual pattern of a compound, we would expect some differences among the examples in (11). However, all the compounds carry an identical accent pattern, with an accent falling in the final position of the N1, providing evidence for the determinative power of the N2, and the non-determinative power of the N1.

We have so far observed that N2 plays a critical role in determining the position of a compound accent. Given this, three things can happen to a compound in terms of accentuation: First, its accent can fall in the identical position of the original accent of N2. This is illustrated in (9a) and (10b), as well as in (12) below:

\[(12)\]
\[\begin{align*}
\text{a. } & \text{pérusya ‘Persian’ } + \text{ néko ‘cat’ } \rightarrow \text{perusya-néko ‘Persian cat’} \\
\text{b. } & \text{iwasi° ‘sardine’ } + \text{kúmo ‘cloud’ } \rightarrow \text{iwasi-gúmo ‘fleecy cloud’} \\
\text{c. } & \text{náma ‘raw’ } + \text{biíru ‘beer’ } \rightarrow \text{nama-biíru ‘draft beer’}
\end{align*}\]

Second, a compound accent can shift to the left edge of N2 when N2 is long, or to the right edge of N1 when N2 is short. This has been already discussed in (8), and is also exemplified in (9b), (10b), and (11), as well as in (13) below (where symbols σ, σ, -, and # indicate “light syllable”, “accented light syllable”, “morphological boundary”, and “word ending” respectively):

\[(13)\]
\[\text{Shifted Accent:}\]
\[\begin{align*}
\text{a. } & \text{Long N2: } \ldots\sigma-\sigma-\sigma\ldots\# \\
& \text{dénki ‘electricity’ } + \text{kamisóri ‘shaver’ } \rightarrow \text{denki-kámisori ‘electric shaver’} \\
\text{b. } & \text{Short N2: } \ldots\sigma-(\sigma)\# \\
& \text{abaré° ‘restiveness’ } + \text{umá ‘horse’ } \rightarrow \text{abaré-uma ‘restive horse’}
\end{align*}\]

Finally, a compound may appear unaccented, as in (14), as well as in (3) and (6a, c):

\[(14)\]
\[\text{Unaccented Compounds}\]
\[\begin{align*}
\text{a. } & \text{iró ‘colour’ } \rightarrow \text{oriibu-iro° ‘olive colour’} \\
\text{b. } & \text{yamá ‘mountain’ } \rightarrow \text{garakuta-yama° ‘a pile of junk’} \\
\text{c. } & \text{ka ‘person’ } \rightarrow \text{benkyou-ka° ‘hard worker’} \\
& \text{ensyutu-ka° ‘play director’} \\
& \text{karate-ka° ‘Karate master’}
\end{align*}\]

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\(^{11}\) There is no prefecture name which consists of four light syllables and is penultimate. However, a nonsense compound formation of higesóri ‘shaving’ + kén ‘prefecture’ should appear higesóri-ken, which in fact, seems to be a preferred candidate to anything else.
d. ya ‘shop/restaurant’ → gyuuudon-ya° ‘beef-bowl restaurant’
   → nandemo-ya° ‘jack-of-all-trades’
   → sitate-ya° ‘tailor’

e. kai ‘purchase’ → syoodoo-gai° ‘impulse buying’
   → sinyou-gai° ‘buying on credit’

These cases where a compound surfaces with no accent show several idiosyncrasies, which are summarized as puzzles in (15) with detailed discussion of each below:

(15) The Three Puzzles of Unaccented Compounds

**PUZZLE 1** All the deaccenting N2s are finally accented when they appear in isolation. (McCawley 1968: 168)

**PUZZLE 2** Some compounds with a N2 consisting of two light syllables appear unaccented only if the compound consists of 4 light syllables.

**PUZZLE 3** There is no unaccented compound with a long N2. ¹²

First, it has been observed that all the deaccenting N2s are finally accented when they appear in isolation. Some examples are given in (16):

(16) Deaccenting Morphemes


b. yamá ‘mountain’ → ko-yama° ‘hill, small mountain’, iwa-yama° ‘crag’, suna-yama° ‘sand hill’, matutake-yama° ‘mountain where matsutake mushroom grows’, ubasute-yama° (or obasute-yama°) ‘a mountain where grandmother were left abandoned’


¹² There are some exceptions. In particular, when a super-long word (a word with more than five morae) is used as N2, a compound may appear unaccented (Tanaka, 2001: footnote 1). For example, karihorunia° ‘California’ is consistently deaccenting, as kita-karihorunia° ‘North California’. However, this may be due to the fact that some loanword endings, like -(n)ia in a place name or -ingu meaning English -ing, act like a quasi-morpheme, which induce unaccented outputs, like short compounds. Note also that kita-karihorunia and kita-kärirunia are acceptable as well for many speakers.

¹³ When the N1 of a compound with go ‘language’ is monomoraic, the compound is consistently accented: ká-go ‘Chinese language’, só-go ‘parent language’, kó-go ‘archaic language’, gá-go ‘graceful language’, si-go ‘dead language’. These instances require further investigation.
e.  *ká* ‘department’ → *yak-ka*° ‘department of pharmacy’, *jinbun-ka*° ‘department of humanities’, *setsin-ka*° ‘department of psychiatry’, *kasei-ka*° ‘department of home economics’

f.  *semé* ‘offence’ → *siro-zeme*° ‘attacking a castle’, *hyourou-zeme*° ‘starvation tactics’, *tikara-zeme*° ‘offence without tactics’

g.  *husí* ‘tune’ → *naniwa-busi*° ‘melody of Osaka’, *inaka-busi*° ‘countryside tune’, *kuroda-busi*° ‘tune of Kuroda, song for drunks’, *oiwake-busi*° ‘a kind of folk song’,* oppkepe-busi*° ‘a kind of old satiric tune’

h.  Short N2 with Non-final Accent to Compare

míso ‘miso’ → *su-míso* ‘miso with vinegar’, *saikyou-míso* ‘Kyoto-style miso’, *Kinzanji-míso* ‘Kinzanji-style miso’

No theoretical account of this unidirectional correlation has been made to date, to my knowledge.

The second puzzle in (15) points out that even when the context is not for a compound to be unaccented, particular lexical items may deaccent only if N1 is bimoraic. Consider the cases in (17) for example:

(17) a.  i.  *péryusa* ‘Persian’ + *néko* ‘cat’ → *péryusa-néko* ‘Persian cat’
ii.  *kúro* ‘black’ + *néko* ‘cat’ → *kuro-neko*° ‘black cat’
iii.  *yámá* ‘mountain’ + *néko* ‘cat’ → *yama-neko*° ‘wildcat’
iv.  *mike* ‘three-hair’ + *néko* ‘cat’ → *mike-neko*° ‘tortoiseshell cat’
v.  *nóra* ‘field’ + *néko* ‘cat’ → *nora-neko*° ‘stray cat’
vi.  *syámú* ‘Siam’ + *néko* ‘cat’ → *syamu-neko*° ‘Siamese cat’
vii.  *kái*° ‘keeping’ + *néko* ‘cat’ → *kai-neko*° ‘kept cat’

b.  i.  *maruta*° ‘log’ + *hasí* ‘bridge’ → *marutá-basi* ‘log bridge’
ii.  *taiko*° ‘drum’ + *hasí* ‘bridge’ → *taikó-basi* ‘arched bridge’
... iii.  *mégane* ‘eye glasses’ + *hasí* ‘bridge’ → *megané-basi* ‘humpbacked bridge’
iv.  *isí* ‘stone’ + *hasí* ‘bridge’ → *isi-basi*° ‘stone bridge’
   v.  *turi*° ‘hanging’ + *hasí* ‘bridge’ → *turi-basi*° ‘hanging bridge’
   vi.  *íta* ‘board’ + *hasí* ‘bridge’ → *íta-basi*° ‘board bridge’

The compound *perusya-néko* ‘Persian cat’ in (17a-i) bears an accent, indicating that a nominal item *néko* ‘cat’ is not a deaccenting morpheme, and thus is not expected to be deaccenting in compounds. Notice that this is also confirmed by Puzzle 1 discussed above since *néko* ‘cat’ is not finally-accented. Nonetheless, when it forms a compound with a *bimoraic* N1, particularly one which consists of two light syllables, it is

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14 Note that the N1 *ka-i* ‘keeping’, a nominalized form of the verb *ká-u* ‘keep (a pet)’ is unaccented in isolation, if it occurs at all. This means that the accentual pattern of this nominalized form cannot be determined. It should be confirmed that the indeterminacy of accent should not be read as ‘unaccented’ and thus it contrasts with the form which has °, or is truly unaccented.

15 This compound may also be used as a place name with identical characters (板 *íta* ‘board’ + 橋 *hasí* ‘bridge’), but it needs to beaccented when the form is a placename; *íta-basi* ‘Itabashi’.
deaccenting as illustrated by various examples in (17a). A similar observation is made for compounds with hasi ‘bridge’; a compound with it as N2 carries an accent in the antepenultimate position when its N1 is long, but it is realized with no accent when its N1 is bimoraic. For the sake of convenience, we will hereafter use the term 2+2 deaccentuation to refer to this phenomenon in this paper. It seems apparent that some issue with prosodic weight plays a role in this 2+2 deaccentuation, and thus the phenomenon seems to be in the domain of phonology rather than that of morphology. However, data like those in (18) point out that we cannot simply dismiss the importance of morphology to account for the 2+2 deaccentuation:

(18)  

\[\text{hime ‘princess’ with Long N1}\]
\[\begin{align*}
\text{a. } &\text{oyá-yubi}\textsuperscript{16} \text{ ‘thumb’} + \text{hime ‘princess’} \rightarrow \text{oyayubi-hime} & \text{‘Thumbelina’} \\
\text{b. } &\text{nemuri\textsuperscript{0} ‘sleeping’} + \text{hime ‘princess’} \rightarrow \text{nemuri-hime} & \text{‘Sleeping Beauty’} \\
\text{c. } &\text{sibiré ‘numbness’} + \text{hime ‘princess’} \rightarrow \text{sibiré-hime} & \text{‘quiet princess in Kabuki play’}
\end{align*}\]

\[\text{hime ‘princess’ with Short N1}\]
\[\begin{align*}
\text{d. } &\text{utá ‘song’} + \text{hime ‘princess’} \rightarrow \text{utá-hime} & \text{‘(female) singer’} \\
\text{e. } &\text{mai\textsuperscript{0} ‘dance’} + \text{hime ‘princess’} \rightarrow \text{mai-hime} & \text{‘(female) dancer’} \\
\text{f. } &\text{sira\textsuperscript{17} ‘white’} + \text{hime ‘princess’} \rightarrow \text{sirá-hime} & \text{‘winter goddess’}
\end{align*}\]

With long N1s like oyá-yubi ‘thumb (lit. ‘parent -finger’), nemuri\textsuperscript{0} ‘sleeping’ and sibiré ‘numbness’, the compounds with the N2 hime ‘princess’ in (18a–c) are all accented, confirming that the N2 is not a deaccenting morpheme—going along with the fact that it is not finally-accented. Given that the N2 hime consists of two light syllables, if the deaccenting observed in (17) were purely prosodically driven, we would expect an unaccented compound with hime when the N1 is bimoraic, as it meets the structural description for 2+2 deaccentuation to take place. However, this is not what we find: Compounds like utá-hime ‘(female) singer’ in (18d–f) all meet the 2+2 environment, yet they all surface with an accent. This indicates that the phenomenon cannot be accounted for by considering only the phonology of these forms. This phenomenon has been mentioned in a number of previous studies (for example, Kubozono and Ogawa, 2004 and Kubozono and Fujiura, 2004), but there has been no adequate theoretical account for it.

To summarize, only short compounds with final accent can be deaccenting, and only a subset of short N2s with final accent are actually deaccenting (Kubozono, 1995). Furthermore, non-deaccenting N2s may trigger deaccenting under certain prosodic conditions. These are three puzzles which demand an account, and, as pointed out already, to my knowledge no theoretical explanation has been provided yet for any of them. At this point, we are not in a position to provide an analysis which accounts for all three puzzles, although the ultimately adequate analysis of Japanese nominal compound should be able to fully address to all of these puzzles. The analysis provided in the following

\[\text{16 An unaccented variation, oya-yubi\textsuperscript{0}, is also grammatical.}\]
\[\text{17 The form sira- is a (archaic) form which is specifically used for the N1 position of a compound; sirá-yuki ‘white snow’, sirá-ito\textsuperscript{0} ‘white string’, or sira-kaba\textsuperscript{0} ‘white birch’. The form siro is used otherwise. A similar fact is observed with ame/ama- ‘rain’; amá-gasa ‘rain umbrella’, ama-gáppa ‘raincoat’, ama-gumo\textsuperscript{0} ‘rain cloud’, and ama-gáeru ‘tree green frog’}\]
section provides an analysis for Puzzle 3, the short/long asymmetry, and is a first step forward towards the full analysis of Japanese unaccented compounds.

3. Accounting for the Short-versus-Long Asymmetry

This section makes a proposal about how compounds are constructed in the domain of prosody; more precisely, it is claimed here that prosodically there are (at least) two types of compounds available in Japanese, word compounds and extended-word compounds. The distinction between these two types of compounds becomes visible through a scrutiny of abstract prosodic status, although the distinction is covert if we consider only superficial morphology. The most welcome result of this analysis is that we can then eliminate the notion short/long as a theoretical primitive, or to rephrase, we can provide a theoretical foundation to the seemingly arbitrary distinction which lies between two morae and three morae. A long compound inevitably results in an extended-word compound, whereas a short compound inevitably results in a word compound. I argue that the deaccenting asymmetry between short and long compounds is due to this fundamental difference in prosodic structure.

3.1 Assumptions

Following Kubozono (1995) and Tanaka (2001), we make the following set of assumptions. Before going into detail concerning the parsing of words into prosody, it should be noted that Japanese is a weight-sensitive language, which in turn indicates that foot construction is mora-based (Poser, 1990). Thus, unlike English, the notion of syllable is relatively obscured, and therefore we will not indicate syllable layer in the following unless necessary.

3.1.1 Parsing with the Strict Layering Hypothesis

First, parsing of prosodic constituents takes place from right to left, with ‘mora’ ($\mu$) being the primitive prosodic unit. Second, the analysis assumes the Strict Layering Hypothesis (Selkirk, 1984), that a unit of a certain prosodic level must always be immediately dominated by a unit of the next higher prosodic level, so that no bypassing of dominance relations is allowed. Thus, assuming that A is a unit of the highest level, B is of the next highest level, and C is of the lowest level, with no level in between. Strict Layering dictates that the structure in (19a) is permissible whereas the one in (19b) is not.\(^{18}\)

\(^{18}\) Also see Itô and Mester (1992) for arguments for a weak layering analysis based on truncation. Tanaka (2005) notes that this issue seems to be ultimately trivial under OT, as both a weak layering representation and a strong layering representation are achievable by different rankings of the same set of constraints. I assume that the constraints that yield strict layering are highly ranked.
(19) **Strict Layering**

a. **Permissible**

```
    A
   / \    
  B   B
 /     /  \
C   C   C
```

b. **Impermissible**

```
    A
   /     \
  B     
 /       \
C   C   C
```

The ill-formedness of the structure in (19b) arises from the fact that a unit C is directly dominated by A, bypassing B, a unit of the level which immediately dominates the level of C. The structure in (19a), on the other hand meets the criterion imposed by the Strict Layering Hypothesis, at the cost of a unary branching unit B.

### 3.1.2 Binary Parsing

It is further assumed that parsing is maximally binary, particularly at the foot level (Poser, 1990). Thus, a unit may consist of either one sub-level unit or two, as in (20a) and (20b), but it cannot consist of three or more sub-level units as in (20c).

(20) **Binary Requirement: Allowed and disallowed structures**

a. \( C_n \)  

b. \( C_n \rightarrow C_n \rightarrow C_n \rightarrow C_n \rightarrow \ldots \)  
c. \* \( C_n \rightarrow \ldots \rightarrow C_n \rightarrow C_n \rightarrow C_n \rightarrow \ldots \)  

Note also that a binary structure is always preferred over a unary one, and a unary branching structure such as the one in (20a) should be allowed as a “last resort” only when Strict Layering is otherwise violated.

### 3.1.3 Morphology-sensitive Parsing

We assume that prosodic parsing is sensitive to morphological boundaries, and a prosodic parsing cannot cross a morpheme boundary. Further parsing occurs inside-out from the head root. That is, until the parsing exhausts all the constituents of a (head) morpheme and until the structure reaches a single unit of a certain level within a given morphological domain, merger with constituents of morphologically external elements cannot take place; in other words, I assume **cyclicity**. The hypothetical structures in (21) below illustrate this point. These structures are based on the following conditions in addition to strict layering and binarity: i) \( Z \) is a primitive unit of (prosodic) structure, and ii) the head morpheme appears on the right side. Thus, a sequence of \( Z \)s following a morphological boundary “-” is the head, and the structural representations borrowed from *Categorial Grammar* (e.g., Steedman, 1996) below the sequence of \( Z \)s explicate morphological structure (\( M_{HD} \) indicates the head morpheme). The structures, (21a–b), (22a–b), and (23a–b) each form permissible-impermissible pairs with identical strings of

---

19 However, we will see some violation of this restriction below.
primitive units and a morphological boundary. Let us consider first the pair (21a–b):

(21) Morphological Sensitivity of Prosodic Parsing

<table>
<thead>
<tr>
<th>Permissible</th>
<th>Impermissible</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
</tbody>
</table>

The Z units are parsed prosodically from right to left starting from the head root. Since there are three Zs in the head, there will be one Z that cannot have a sister, given the principle of binary parsing and the constraint that prosodic parsing is sensitive to morphological structure. The difference between (21a) and (21b) thus arises from the fact that the leftover Z in the head root is parsed by itself to a higher category in the permissible structure (21a), whereas it is parsed with a Z outside of the morphological domain of the head in (21b). This move in (21b) is illicit since the leftover element needs to be parsed first with the other elements within the same morphological domain, given morphology-sensitive parsing. (21a) ensures that the principle of morphologically-based parsing is met, at the cost of having unary branching and less ‘compact’ prosodic structure.

The pair (22a,b) observes a similar effect, except all the primitive elements are parsed within the domain of the head morpheme in both structures, and ill-formedness is observed at a higher abstract level of the structure in (22b):

(22) Morphology Sensitive Parsing at Abstract Level

<table>
<thead>
<tr>
<th>Permissible</th>
<th>Impermissible</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
</tbody>
</table>

Here, the binary leftward parsing creates a stray non-terminal unit A in both (22a,b). The
licit structure (22a) projects a higher unit B by the stray unit of A alone, and the prosodic units do not form a constituent with the elements of the other morphological domain until they culminate at the level of C. On the other hand, the stray A in (22b) forms a constituent with a morphologically external unit before culmination within the morpheme takes place, inducing illicitness.

The last pair (23a,b) requires careful consideration:

(23) **Morphology Sensitive Parsing: Case with Monomoraic Roots**

a. *Permissible*

\[
\text{B} \\
\text{A} \\
\text{A} \\
\text{Z} - \text{Z} \\
\text{M} \text{M}_{\text{HD}} \\
\text{M}_{\text{COMP}}
\]

b. *Impermissible*

\[
\text{A} \\
* \text{A} \\
\text{Z} - \text{Z} \\
\text{M} \text{M}_{\text{HD}} \\
\text{M}_{\text{COMP}}
\]

What is the crucial in this case is that both morphemes consist of only one prosodic primitive. This fact seems to give a (false) impression that the (root) morpheme has reached a culminating point without having any projection, as in (23b). In fact, this is not what happens, and thus the structure in (23b) should be understood as illicit under the conception of morphology sensitive parsing; rather, the primitive unit has to be parsed once by itself before it is combined with the element in the other side of the boundary, as in (23a).

3.1.4 Parallel Prosodic Architecture

Finally, following an idea proposed by Inkelas (1990) and implemented particularly by Fitzpatrick-Cole (1996), we further assume a division between the metrical layer and the prosodic layer provided in (24), with minor modifications to be made later in this section:

(24) **Metrical Layer**

\[
\text{W} . . . . . . . Metrical Word \\
\text{F} . . . . . . . Foot \\
(\sigma \text{ . . . . . Syllable })^{20} \\
\mu \text{ . . . . . Mora}
\]

**Prosodic Layer (To be modified)**

\[
\ldots \\
\omega \text{ . . . . . Prosodic Word (PrWd)} \\
\psi \text{ . . . . . Prosodic Stem (P-stem)}
\]

---

20 The syllable is included in the position between Mora and Foot, as I follow the structure provided by Fitzpatrick-Cole (1996), but the actual position of this category is debatable, and at least it is not a necessary element for the analysis I present in this paper. See Asano (2002) for arguments that the syllable level is not immediately dominated by the foot level.
Notice that the upper terminal of the metrical layer is the Metrical Word, and it does not extend any further, unlike a commonly assumed unary prosodic structure which unifies both the metrical and the prosodic layers. 21 It is the units of the prosodic layer which are formally structured with higher levels of prosody, such as the *Intonational Phrase* or *Phonological Phrase*. As a consequence, it is not guaranteed that a mora unit, the minimal terminal unit of the metrical layer will be parsed to an *utterance*, the assumed highest prosodic level, by just a ‘compositional’ parsing operation. Instead, it is necessary to assume some sort of a function which ensures the mapping, or correspondence, of a structure of one layer to the other. I assume a mapping from a Foot category to a Prosodic Stem in Japanese, incorporating Itô’s (1990) analysis, a synopsis of which follows:

Itô (1990) observes that Japanese obeys a ‘minimality’ requirement based on the patterning of truncations and hypocoristic forms. Consider the following patterns of loanword truncation:

\[
(25) \text{Loanword Shortening (from Itô, 1990: (8), (17))}
\]

\[
\begin{align*}
a. & \quad \text{púro} (\text{\*purofe, \*pu}) \rightarrow \text{purofeyonaru} \quad \text{‘professional’} \\
b. & \quad \text{súto} (\text{\*sutora, \*su}) \rightarrow \text{sutorâiki} \quad \text{‘(labour) strike’} \\
c. & \quad \text{\*san} (\text{\*sándo, \*sa}) \rightarrow \text{sandoitî} \quad \text{‘sandwich’} \\
d. & \quad \text{\*an} (\text{\*anpu\°, \*a}) \rightarrow \text{anpurifyâa} \quad \text{‘amplifier’} \\
e. & \quad \text{\*paa} (\text{\*páama, \*pa}) \rightarrow \text{paamanêto} \quad \text{‘permanent (hairstyle)’}
\end{align*}
\]

In Japanese, truncation generally, though not always, keeps the left-edge substring. The data in (25) show that truncated forms need to satisfy two conditions, bimoraicity for one, and disyllabicity for the other. Thus, when a form resulting from shortening consists of two light syllables, like the examples in (25a), it satisfies both conditions. When its initial syllable is heavy, like the ones in (25b), on the other hand, a form is not able to confirm to both conditions. If a truncated form of an initially heavy word tries to meet the bimoraicity requirement, it fails to meet the disyllabicity requirement. The most harmonic resolution of this case is to retain one more syllable in the truncated form, as exemplified with \text{\*sándo ‘sandwich’}, \text{\*anpu ‘amplifier’}, and \text{\*páama ‘permanent’} in (25b). However, Itô (1990) shows that the bimoraicity requirement and disyllabicity requirement emerge from different needs of the grammar, by considering what she calls ‘compound abbreviation’:

\[
(26) \text{Compound Abbreviation (from Itô, 1990: (20), (23), (24))}
\]

\[
\begin{align*}
a. & \quad \text{hebii-métaru} \quad \rightarrow \quad \text{hebi-meta} \quad \text{‘heavy metal’} \\
b. & \quad \text{jiinzu-pántu} \quad \rightarrow \quad \text{jiî-pan} \quad \text{‘jeans pants’} \\
c. & \quad \text{hangaa-sutorâiki} \quad \rightarrow \quad \text{han-suto} \quad \text{‘hunger strike’}
\end{align*}
\]

Compound abbreviation is a process which truncates both members of a compound. Except for a handful of rare cases, the process keeps only the first two morae of each member of a compound; hence, \([N_1 \mu_1 \mu_2 \mu_3 \ldots] - [N_2 \mu_1 \mu_2 \mu_3\ldots] \rightarrow [N_1 \mu_1 \mu_2]\) \([N_2 \mu_1 \mu_2]\).

---

21 What I mean by ‘unary prosodic structure’ is mathematically defined as a totally ordered set of all the assumed prosodic categories, such that, where \(P = \) a set of all prosodic categories, \(\forall (a, b, c) \in P \{ (a < b \& b < c) \rightarrow (a < c) \} \) holds. Usually such structure views that the category above Foot is Prosodic Word, leading all the way to Utterance.

36
What is crucial here is that in abbreviated compounds, the disyllabicity requirement is not strictly followed, unlike the simple loanword truncation cases discussed in (25). In particular, notice both truncated members of the abbreviated compound *jii-pan*° ‘jeans pants’ (26b) are heavy syllables. If a minimality requirement is an irreducible condition which ensures that a truncated word have two light syllables (i.e., the bimoraicity requirement and the disyllabicity requirement are inseparable), we should expect *jiiin-pantu* to be grammatical, and the actual form jii-pan° is unexpected. Similarly, the truncated first member han of han-suto° ‘hunger strike’ (26c) does not meet the disyllabicity requirement, though the abbreviated compound is fully acceptable. Itô (1990) claims that this apparent inconsistency of the requirement on truncation is due to a minimality effect at different levels. More specifically, Japanese phonology has two kinds of minimality requirements; one is the Minimal Stem Requirement (MSR) and the other the Minimal Word Requirement (MWR): 23

\begin{align*}
&\text{(27) } \text{Minimality Requirements in Japanese (Itô, 1990: (25–26))} \\
&\text{a. Minimal Stem Requirement: } \text{Min(STEM)} = F = [\mu\mu] \\
&\text{b. Minimal Word Requirement: } \text{Min(WORD)} > \sigma
\end{align*}

These requirements explain why we find a difference between (25) and (26). In the case of simple loanword shortening in (25), a truncated form needs to satisfy both of the MSR and the MWR. Therefore, *súto* from sutoráiki ‘(labour) strike’ in (25) is well-formed, since it consists of two morae, satisfying the MSR, and of two syllables, satisfying the MWR. On the other hand, truncation of *san* from sandoítti is not permissible in the language, although it obeys the MSR by being bimoraic, since the MWR is violated as it consists of only one syllable. One of the most important gains of this analysis is that it is a natural consequence that the MWR appears to be somewhat tolerated in case of abbreviated compounds, since it is only the MSR which bears on the truncated members of a compound, and the MWR bears on a larger domain, namely the entire compound:

\begin{align*}
&\text{(28) Abbreviated Compound and Minimality Requirements} \\
&\begin{array}{c}
\mu \\
\sigma \\
\mu \\
\mu
\end{array} \\
&\begin{array}{c}
\mu \\
\mu \\
\mu
\end{array}
\end{align*}

In (28), each of the abbreviated members *jii*- and -*pan* of a compound *jii-pan* ‘jeans pants’ satisfies only the MSR, but the apparent violation of the MWR is in fact not a violation since the locus of evaluation of the requirement is the whole compound. This

\footnote{And also note that the truncation pattern which keeps only the first (light) syllables of each member of a compound is next to impossible, though such a form conforms to both of the bimoraicity and disyllabicity requirements, at least superficially. Itô (1990: (21)) notes that 134 cases out of 142 show the 2\(\mu\)+2\(\mu\) pattern.}

\footnote{Note that, as Itô (1990) mentions, these requirements are applicable only to derived words, and they do not apply to underived words. Therefore, monomoraic words ka° ‘mosquito’ or ti° ‘blood’ are still grammatical albeit the requirements. Note also that dialects of Kansai region obeys the requirement more strictly, and applies even to underived words; thus, ka° ‘mosquito’ and ti° ‘blood’ are realized as kaa and tii respectively.}
empirical observation would be left as a mystery if we do not assume both of the requirements.

Crucially, Itô’s analysis defines the MSR with the equation symbol ‘=’, and thus it should be read as “a well-formed stem should have a size exactly of a foot.” This is quite different from the requirement for word-hood which is purely a requirement of minimality, such that a phonologically well-formed word should be at least disyllabic. Therefore, the minimality requirement for the stem is regarded more like a template although Itô (1990) herself does not explicitly argue that the requirement is templatic. In fact, the following observation suggests that the requirement is not really of minimality, but templatic.

Let us first review some properties of truncation with examples in (29a,b).

(29) *Pattern of Truncations I* (Itô, 1990: (28) (a period indicates a syllabic boundary))
   a. *kon.bi.nee.syon ‘combination’* → *kon, konbi*
   b. *baa.ten.daa ‘bartender’* → baaten, *baate*

The truncation pattern found in (29a) is a case similar to the ones in (25b); the first three segments *kon* form two morae to satisfy the requirement for stem-hood, but fail to satisfy the MWR since they form only one syllable. Therefore an extra syllable *bi* is necessary, which Itô assumes attaches as a phonological suffix to create a well-formed truncated form. In the loanword truncation *baaten* in (29b), the extra syllable to satisfy the MWR is not short. This observation indicates that the salvaging syllable does not have to be minimal, and Japanese seems to prefer to maintain the integrity of the prosodic structure of the source word of truncation. If the language were to prefer to have something just enough to satisfy the MWR and not more than that, it would have derived *baate* as a grammatical form instead.

With this much, now we are ready to discuss what is crucial to us in (30):

(30) *Pattern of Truncations II* (Itô, 1990: (28, 29, 47))

dem.on.su.to.ree.syon ‘demonstration’ → demo, *demon*

Let us first consider the truncation process in (30). Crucially the grammatically truncated form *demo* of *demonstreesyon ‘demonstration’* does not retain the coda moraic nasal of the heavy syllable *mon*. This goes against the case with *baaten ‘bartender’* in (29b), which retains the coda nasal. Itô claims that this is due to some kind of alignment constraint in that a stem of a truncated form needs to be at the left edge. Thus, in the case of *baaten ‘bartender’* the initial heavy syllable *baa* suffices to be a stem, and *ten* attaches as a suffix to satisfy the MWR. On the other hand, in the case of *demo*, if we retain the coda moraic nasal of *mon* in a truncated form as *demon*, the structure of the truncated form results in a stem being in a non-left-edge position. The left-edge element *de* is too short to be realized as a stem, and thus it can be realized only as an affix. The only way to solve this is simply to clip the coda nasal, and form *demo* as a stem, at the cost of failing to mirror the syllabic integrity of the original structure:
What is implicit but crucial to us here is the assumption that the MSR is a template. If the requirement is of genuine minimality, then we would find the truncated form \textit{demon} to be acceptable by parsing the whole sequence to be a stem; \textit{[de.mon]}\textsubscript{Stem}. However, this parsing is not an option, simply because the MSR is a \textit{template}, and it cannot contain anything more than two morae. Thus, \textit{demon} is ungrammatical, as the sequence \textit{de} is too small to be a stem though it is at the left edge, and the sequence \textit{mon} is not at the left-edge although it satisfies the MSR in terms of quantity. The best phonology can do is to cut off the coda nasal of \textit{mon} and parse \textit{demo} as a stem.

Taking Itô’s (1990) analysis, I will assume that there is a mapping from foot to a stem. However, this assumption further assumes that the notion of phonological stem exists in prosody. A commonly assumed unary prosodic structure would face some serious trouble with this assumption, since it is not clear where such a category is located in a unary prosodic structure even though its existence is motivated. What we wish to express is that a unit of foot corresponds with (or maps to) a unit of a (phonological) stem, and not that the denotation of foot and the denotation of stem are identical. At best a unary notation assumes that something referred to as a stem is floating undefined in some domain of morphophonology. On the other hand, the parallel prosodic structure rigidly defines the level of stem in its place in prosody with its relation to the other categories, such as Prosodic Word.\textsuperscript{24} The original formation of the MSR of Itô (1990) is in concord with Optimality Theory, a purely constraint-based theory which is assumed in this paper, and thus we can restate the requirement simply as a correspondence of foot and P-stem:\textsuperscript{25}

\begin{equation}
\text{(32)} \quad \textit{Foot-P-stem Correspondence Constraint}
\end{equation}

\text{ALIGN}(F, P\textsubscript{stem}): \text{A unit of foot level corresponds with a unit of P-stem level.}

\subsection*{3.2 Fundamental Analysis: Structures}

Now with the assumptions laid out above, we are ready to investigate the structures of Japanese nominal compounds. The parsing mechanism which was presented above yields a clear structural distinction between short and long compounds.

\textsuperscript{24} Also, we will find later in the analysis of compound accentuation that the mapping between foot and phonological stem exhibits Head-dependent Asymmetry of \textit{visibility}. Dresher and van der Hulst (1998) propose that a visibility-based HDA should be exhibited only where some inter-plane relation is established. Thus, if we take the argument the other way around, that is if we observe that the visibility HDA is an inevitable feature in Japanese phonology, it provides some strong evidence for the parallelist structure.

\textsuperscript{25} Which edge needs to be aligned for this constraint is not an issue at least for compound accentuation, as it does not induce any difference to the issues to be discussed in the rest of this paper. Also this constraint needs some refinement later, when we consider the notion of Head-dependent Asymmetry.
First, let us note an obvious and uncontroversial observation that in Japanese, N2 is always the head of a compound. This is clear semantically, as maki-zusi ‘rolled sushi’ means a kind of sushi ‘sushi’, but not a kind of a rolled thing, and similarly, koku-ban ‘black board’ is a kind of ban ‘board’. Thus, assuming the head-first prosodic parsing outlined in section 3.1.3, parsing takes place beginning with N2. Given the fact that a short N2 consists of one or two morae while a long one is longer than that, we may observe that a short N2 always forms maximally one foot by itself, and will never form more than one foot under any circumstance. On the other hand, a long N2 always forms two or more feet, and it never forms only one foot all alone:

\[(33)\]  

\[\text{a. Short N2} \quad \begin{array}{c}
\text{F} \\
\text{μ μ}
\end{array} \quad \text{b. Long N2} \quad \begin{array}{c}
\text{F} \\
\text{μ μ μ}
\end{array}\]

Given the foot to P-stem mapping argued for in section 3.1.4, this entails that a long N2 is bound to carry multiple stems by itself, whereas a short N2 only carries one P-stem by definition:\[26\]

\[(34)\]  

\[\text{Mapping from Foot to P-stem} \quad \begin{array}{c}
\text{a. Short N2} \\
\text{Prosodic Tier} \\
\text{Metrical Tier} \\
\text{ψ} \\
\text{F μ μ μ}
\end{array} \quad \text{b. Long N2} \\
\text{Prosodic Tier} \quad \text{Metrical Tier} \quad \text{ψ} \quad \text{ψ} \quad \text{F μ μ μ}\]

It is further entailed, given the principle of binary parsing, that a long N2 always carries enough material to project to a higher Prosodic category, the Prosodic Word. In fact, a long N2 cannot culminate, or exhaust all of its metrical content, anywhere lower than PrWd, by definition. A short N2, on the other hand, culminates at the foot level, and it can

---

\[26\] Note that a monomoraic foot is parsed to a P-Stem in (34b). This follows from the assumptions that are provided above, more precisely the Strict Layering Hypothesis (section 3.1.1), and the Foot-P-stem Correspondence Constraint given in (32). This may appear to be inconsistent with the minimal stem requirement discussed in section 3.1.4, but my understanding is that it is not. While it is undeniable that some minimality effect is at play in Japanese morphophonology, the effect is a matter of truncation, a process which seeks the best shortest form. In the case of compounding, each sub-element of a structure need not satisfy the requirement iteratively once the requirement is minimally satisfied. It is at least an independent research question what the status of a subminimal foot is in a theory of parallel prosodic/metrical architecture, which I assume in this paper. Thus, in the case of (34b), the requirement is met by word-final binary foot. This idea is analogous to the Principle of Minimal Compliance proposed by Richards (1998) for a Minimalist framework of syntax. In the cases of compounds with a monomoraic item, I understand that the minimality is necessarily violated so that the form meets the requirement of parsing everything in order to be at least recognized as a linguistic form.
never culminate anywhere higher than P-stem level, exhibiting the structural contrast shown in (35):

(35) Short-versus-Long: Different Culminating Point
  a. Short N2  
  b. Long N2

\[
\begin{array}{c}
\text{Metrical Tier} \\
\text{Prosodic Tier} \\
\end{array}
\]

Given this difference in culmination points between short and long stems, a compound with a long N2 necessarily culminates at a prosodic level higher than PrWd. I assume that this category above the normal PrWd is the extended Prosodic Word (ω⁺), and I call the usual PrWd of a compound a core Prosodic Word for the sake of clarity.27 The structure in (36) shows the structure of a compound with a long N2 projecting to the extended PrWd level with its N1:

(36) Structure of Compound with a Long N2

\[
\begin{array}{c}
\text{shaded area indicating the domain of N2} \\
\end{array}
\]

Thus, a compound hosí-áwabi ‘dried abalone’ (hosí ‘dry’, áwabi ‘abalone’) has the following prosodic structure:

\[
\begin{array}{c}
\end{array}
\]

---

27 Note that the category extended PrWd is distinct from Clitic Group, and I assume Extended PrWd to be below Clitic Group so that we can account for the cases with case-marking particles are parsed under the Clitic Group. An idea similar to the extended PrWd is not entirely new. For example, Alderete (2001:111) posits P-Comp as a prosodic category specific to compounds.
(37)  / hosi / + / ãwabi / → hosi-ãwabi ‘dried abalone’

\[
\begin{array}{c}
\omega \\
\omega \\
\psi \\
\psi \\
\psi \\
ho \\
si \\
- \\
a \\
wab \\
bi
\end{array}
\]

On the other hand, since a short N2 culminates at the foot level, a short compound culminates at the core PrWd level, as shown in (38):

(38)  Structure of Compound with a Short N2 (shaded area indicating the N2 domain)

\[
\begin{array}{c}
\omega \\
\psi \\
\end{array}
\]

Thus, the compound ko-néko ‘kitten’ with a short N2 néko ‘cat’ is analyzed as follows:

(39)  / ko\degree / + / néko / → ko-néko ‘kitten’

\[
\begin{array}{c}
\omega \\
\psi \\
\psi \\
ko \\
né \\
ko
\end{array}
\]

Compounds with monomoraic N2s, such as ei-go\degree ‘English language’ with gó ‘language’ being in the N2 position, require special attention. Recall the earlier discussion of the structures provided in (23) with regard to the morphology-sensitive parsing; when a head carries only one prosodic primitive the primitive should be parsed just by itself before entering into the inter-morphological parsing. The parsing principle becomes quite important to provide an analysis for compounds with a monomoraic N2, as it requires that the short compound ei-go\degree ‘English language’ should exhibit the structure shown in (40):

(40)  / éi / + / gó / → ei-go\degree ‘English language’

\[
\begin{array}{c}
\omega \\
\psi \\
\psi \\
e \\
i \\
- \\
go\degree
\end{array}
\]

Thus, the singleton mora of the N2 gó ‘language’ in (40) has to undergo parsing into a

\[28\] The structural representation of this example is not entirely accurate. See section 3.2.
foot on its own before it crosses the morpheme boundary. Thus, even if the monomoraic N2 gó ‘language’ forms a compound with a monomoraic N1, the compound must result in two P-stems, hence ruling out (41): ²⁹

(41) **Parsing with Monomoraic N1**

   a.                          b. *

   \[
   \begin{array}{c}
   \omega \\
   \psi \\
   \psi \\
   \end{array}
   \]

   \[
   \begin{array}{c}
   F \\
   F \\
   \mu \\
   \mu \\
   \end{array}
   \]

   \[
   \begin{array}{c}
   – \\
   gō° \\
   \end{array}
   \]

We have so far looked at the structures of short and long compounds and we have concluded that a long compound invariably forms a unit at the level of extended PrWd, whereas a short compound culminates at the core PrWd level. Now we have the answer to the question: why do we find the “watershed” of short-versus-long compound located between two morae and three morae, but why not between one and two, between three and four, or some other random division? We cannot find a divide between monomoraic and bimoraic N2, simply because a compound with either a monomoraic or a bimoraic N2 culminates at the core PrWd level. Similarly, we would not find a divide between trimoraic N2 and quadramoraic N2, because a compound with either element would result in an extended PrWd. ³⁰

Recall that only some short nominals are deaccenting, and thus a long N2 and a deaccenting N2 are in complementary distribution. Now given the prosodic distinction we have achieved so far, the characteristics of short and long N2s with regard to deaccentuation can be re-generalized in terms of prosodic structure:

²⁹ However, it is a matter of a further research whether we can completely dispose of inter-morphological parsing at the foot level, as it may be a correct approach for better understanding of some Sino-Japanese compounds.

³⁰ One would then question what would happen when an N2 has more than four morae. In fact, a noun consisting of five or more morae is considered to be superlong, exhibiting yet a different behaviour, which hints that the analysis is indeed on the right track. The superlong compound is a neglected area of Japanese phonology, but we do not address this issue any further.
(42) Conditions on Compounds and Prosodic-Word (CCPW)

A: An unaccented output is allowed only when the entire compound culminates at the core PrWd level.31

B: When the culminating point of a compound is the extended PrWd, the compound must have an accent:

\[ i. \omega \quad ii. * \omega^+ \]

One might ask why the CCPW holds. The conditions seem to have no good reason to exist, and superficially it looks like the CCPW is a mere rephrasing of the short/long distinction without theoretical motivation. I propose that these conditions are motivated, and they reflect a prosodic requirement which forces a structure to manifest/preserve its structural Head-Dependent contrast by placing an accent. Thus such a requirement emerges as a constraint which ensures an extended PrWd to always surface with an accent. The reason the requirement is inert for a short compound is because a short compound is simply a single PrWd with nothing to be asymmetric with, as the structure culminates at the core PrWd. Thus, the prosodic word can be compared to the English stress pattern, in that a monosyllabic word would not have any prosodic contrast alone, but a bisyllabic word would be required to show a weak/strong contrast. Japanese accent may be thought of as licensing of the head word, and licensing becomes necessary for prosodic reasons only when the prosodic structure culminates at the extended PrWd level, which, in other words, has two PrWds, to manifest the head-dependent contrast. Thus, we may posit that the CCPW is a constraint which is undominated in the ranking system in the sense of Optimality Theory.

Now we have the answer to why we do not find any long deaccenting morpheme in Japanese. The undominated CCPW rules out an unaccented form whenever the N2 is long, regardless of the lexical status of the N2. This entails that whether there is a long deaccenting morpheme in the Japanese lexicon is not an issue, since the CCPW would always rule out such a case before surfacing. That is, this analysis provides us with the Richness of the Base effect. Theoretically it is allowed to assume the existence of a long and deaccenting N2 in the Japanese lexicon. Its deaccenting effect, however, will be nullified by the CCPW constraint. For instance, we can assume a hypothetical deaccenting nominal form eihihú in Japanese. It should surface in isolation as eihihú with the final accent, just like other deaccenting morphemes. Given that it is lexically specified as a deaccenting morpheme, it would force compounds with it being the N2, like oo-eihihú ‘large eihihú’ iwa-eihihú ‘rock eihihú’, or denki-eihihú ‘electric eihihú’, to appear unaccented. However, the morphophonological requirement to deaccent these forms imposed by the presence of eihihú militates against the CCPW constraint. Given that the CCPW is undominated, it wins over the lexical deaccentuation requirement, and thus all the forms are ensured to appear accented, with no exception.

The proposed analysis has the potential to capture parts of a distinction made in the Japanese literature between what is called stem-stem compounds and word-word

31 This explanation is still far from perfect, since it does not explain why all the deaccenting N2s are also finally accented when they appear alone.
compounds. Previous analyses of stem-stem compounds rely on the notion of lexical stratification, with this compound type being in the Sino-Japanese class; hence, such identification relies on lexical information. This differs from the analysis presented here, as the aspect of compound accentuation is determined solely in terms of prosodic structure, and thus it predicts that some native ‘yamato’ words and Sino-Japanese words, which are fundamentally short may act quite similarly.

3.3 A Case of Head-Dependent Asymmetry: Apparent violation of the CCPW

So far we have considered only N2, showing that if it forms an extended prosodic word, then it must be accented. The status of N1 has not been considered, and the reader might have noticed that all N1s in the examples thus far have been short. The analysis laid out in the above section seems to indicate that a compound with a short deaccenting N2 may appear accented when the N1 is long enough so that the entire structure can project to ω⁺. Consider (43), with tama ‘ball’, a deaccenting morpheme (see (16)), as N2:

\[
\text{(43) } /\text{garasu}^\circ /+ /\text{tama} / \rightarrow \text{garasu-dama}^\circ \text{‘glass ball’}
\]

*garasú-dama, *garasu-dáma , *garasu-damá

Since the N1 garasu^° ‘glass’ in garasu-dama^° consists of three morae, it alone constructs a core PrWd. This then seems to imply that a short compound forms an extended PrWd when its N1 is long because the prosodic level of N2 needs to match up with that of N1, given the assumption of Strict Layering, as shown in (43). This structural analysis of a short compound with a long N1 thus predicts that such a compound would be accented to meet the requirement imposed by the CCPW constraint argued for above. However, this is not the case, as accented forms of the compound garasu-dama° ‘glass ball’, such as *garasú-dama, are ungrammatical, even as a variant. This suggests that the structure of N1 is irrelevant.

I argue that this apparent violation of the CCPW is in fact an instantiation of the notion of (syntagmatic) Head-Dependent Asymmetry (HDA) of Visibility proposed by Dresher and van der Hulst (1998). Roughly, a HDA can be regarded as a constraint that states that a dependent cannot exceed a head in terms of structural complexity or visibility. Complexity and visibility can be measured by “depth” of a structure, or by “branching”.

45
First, let us consider the case of visibility, which will be argued for the case of Japanese compounds. Where a visibility-based HDA is at work, the phonological computation of a certain language appears to find the inner structure of a dependent invisible, so that the invisible part may appear to be more complex. Hence, a structure that superficially looks like (44a), in fact seems to have a structure like the one in (44b) (to be revised below) with respect to phonological computation:

\[(44)\quad HDA: Visibility\]

\[\begin{array}{c}
\text{a.} \\
& A \\
& B_{\text{Dependent}} \quad B_{\text{Head}} \\
& C \quad C \quad C \\
& D \quad D \quad D \\
\end{array} \quad \begin{array}{c}
\text{b.} \\
& A \\
& B_{\text{Dependent}} \quad B_{\text{Head}} \\
& C \\
& D \\
\end{array}\]

Drescher and van der Hulst (1998) introduce phonological phrase (\(\phi\)-phrase) formation in Ligurian Italian, discussed by Ghini (1993), as a case in point. In Ligurian Italian, a \(\phi\)-phrase is ideally constructed symmetrically by two phonological words. When there is an odd number of prosodic words, the extra element is assigned as a member of a singleton \(\phi\)-phrase on the left edge:

\[(45)\quad \text{Ligurian Italian } \phi\text{-phrase formation 1} \quad \text{(Dresher and van der Hulst, 1998: 334)}\]

\[\begin{array}{c}
a. \quad \text{Ideal Case: with 4 Prosodic Words} \\
& \left( [\text{Ho-studiàto}]_o [\text{tútto}]_o \phi \left( [\text{il-libro}]_o [\text{di-têsto}]_o \right) \phi \\
& \text{‘I have studied the whole textbook.’} \\
b. \quad \text{A Case with Odd Number of Constituents: Singleton } \phi\text{-phrase on the left edge} \\
i. \quad \left( [\text{Ho-studiàto}]_o \right) \phi \left( [\text{tútto}]_o [\text{il-libro}]_o \right) \phi \\
ii. \ast \left( [\text{Ho-studiàto}]_o [\text{tútto}]_o \right) \phi \left( [\text{il-libro}]_o \right) \phi \\
& \text{‘I have studied the whole book.’} \\
\end{array}\]

However, when a “long” word like \(\text{la-rivoluziône}\) ‘the revolution’ occurs in the final position of a phrase, the long word itself forms a \(\phi\)-phrase as in (46a), and thus, the otherwise expected phrasing in (46b) is not grammatical:

\[(46)\quad \text{Ligurian Italian } \phi\text{-phrase Formation with a Long Word in Final Position} \quad \text{(Dresher and van der Hulst, 1998: 334)}\]

\[\begin{array}{c}
a. \quad \left( [\text{Ho-studiàto}]_o [\text{tútta}]_o \phi \left( [\text{la-rivoluziône}]_o \right) \phi \\
b. \ast \left( [\text{Ho-studiàto}]_o \right) \phi \left( [\text{tútta}]_o [\text{la-rivoluziône}]_o \right) \phi \\
& \text{‘I have studied the whole revolution.’} \\
\end{array}\]

It may appear from (46) that one long word is treated as two words; however, this is not always the case. In fact when a long word occurs in a non-final position, it is treated like any other (non-long) word:
Ligurian Italian \(\phi\)-phrase Formation with a Long Word in Non-final Position

(Dresher and van der Hulst, 1998: 335)

\[\begin{align*}
\text{a. } & (\text{[Ho-studiáto]}_o \phi) (\text{[la-rivoluzione]}_o \text{[francése]}_o) \phi \\
\text{b. } & \text{? (}[\text{Ho-studiáto}]_o \phi) (\text{[la-rivoluzione]}_o) \phi (\text{[francése]}_o) \phi
\end{align*}\]

‘I have studied the French revolution.’

Under Dresher and van der Hulst’s (1998) conception, this is an instance of the HDA of visibility, in that the inner components of a structure, feet in the case of Ligurian Italian, of a word are ‘visible’ only when the word appears in the final position, which is the head position of \(\phi\)-phrase in Ligurian Italian. This visibility induces a problem with the case of (46a). The structure appears ungrammatical because a \(\phi\)-phrase contains more than it can actually contain. The final constituent \text{la-rivoluzione} ‘the revolution’ in (46a) contains two feet, and those feet are ‘visible’ due to the HDA. On the other hand, (47a) is grammatical because \text{la-rivoluzione} ‘the revolution’ is in the non-final dependent position, and hence its feet are not visible, providing a somewhat lenient analysis. Thus, an illicit \(\phi\)-phrase with a long word in the head position (i.e., (46a)) exhibits the structure in (48a) following, with the counted elements in boldface.

\[\text{(48) } \text{(Un)grammaticality Induced by HDA of Visibility of Ligurian Italian}\]

\[\begin{align*}
\text{a. } & \ast \phi \\
\text{b. } & \phi
\end{align*}\]

\[\begin{array}{c}
\phi \\
\hdashline
\phi \\
\hdashline
\text{F} \\
\text{F} \\
\end{array}\]

A visibility-based HDAs show an apparent contradiction with HDAs of complexity. The complexity-based HDA can be described as a (universal) principle that a dependent of a non-terminal unit cannot be more complex than its head. Complexity can be determined in terms of branching or depth—thus, the structures given in (49b–c) are more complex than the one in (49a); (49b) is more complex in terms of branching, and (49c) in terms of depth:

\[\text{(49) } \text{HDA: Complexity}\]

\[\begin{align*}
\text{a. } & \text{A} \\
\text{b. } & \text{A} \\
\text{c. } & \text{A}
\end{align*}\]

\[\begin{array}{c}
\text{B} \\
\text{B} \\
\text{B} \\
\text{C}
\end{array}\]

When a language obeys a complexity-based HDA in some domain of its phonology, it would be prohibited to have a structure whose head looks like (49a) while its dependent looks like either (49b) or (49c). A HDA with respect to complexity requires that a dependent be no more complex than its head. This leads into an apparent contradiction; a structure shown in (50a) below is allowed in terms of a visibility-based HDA while a complexity-based HDA prohibits it. The opposite case is observed in the structure
(50b)—*visibility*-based HDA would prohibit it, while a *complexity*-based HDA would prefer it:

(50) **Head-dependent Asymmetry: Apparent contradiction**

a. 

```
B_{DEP}  B_{HEAD}
C   C
```

b. 

```
B_{DEP}  B_{HEAD}
C   C
```

It is too hasty to conclude from this contradiction that the HDA concept is vacuous, having no effect in grammar. In fact, this is not the case. Dresher and van der Hulst (1998) suggest that the notion of *visibility* governs *inter-*tier phonological relation, whereas *complexity* is something to be exhibited only within a particular tier. Thus, Dresher and van der Hulst claim that, in the case of Ligurian Italian, we may conceive that a foot-level unit in the head constituent maps to a unit of the timing tier, whereas in a dependent, a unit of prosodic word level corresponds to a timing-tier unit.

(51) **HDA of Visibility of Ligurian Italian II**

a. 

```
φ
ω_{DEP}  ω_{HD}
```

b. 

```
φ
ω_{DEP}  ω_{HD}
```

An upshot of this analysis is that the visibility effect is a non-uniform inter-tier *many-to-one* mapping which is sensitive to the structural status of constituents, and therefore the term *visibility* is a misnomer to the extent that the structure is in fact visible to phonological computation for other purposes. It thus follows that the structure provided in (44b) should be revised as in (52):
In (52), a mapping function takes D as an appropriate argument to achieve $\alpha$ in the domain of a head constituent, whereas it takes a higher category B to achieve $\alpha$ in a dependent.

Let us now return to the case of Japanese. My claim is that Japanese shows something quite similar to the Ligurian Italian case. The generalizations which we have obtained so far are (i) that the metrical content of the N2 is crucial in determining whether a compound appears (de)accentuated, and (ii) that no matter how long an N1 is, its metrical content is irrelevant for the computation of the prosodic structure of a compound. Given the syntactic/semantic nature of the morphology of compound formation in Japanese, the N2 of a compound is the head, and the N1 is the dependent. The phonology of Japanese prosodic structure is sensitive to this distinction, and values more what is in the head position than what appears inside the dependent in a compound. Thus, it does not matter how long the N1 (i.e., dependent) is; prosodically the structure of N1 is recognized as a “chunk”. The case fits the notion of Dresher and van der Hulst’s (1998) visibility-based HDA nicely, as it has been already motivated that there is a mapping between the Metrical Tier and the Prosodic Tier in section 3.1.4. The adjustment needed to account for Japanese compounds is that the mapping between the Metrical Tier and the Prosodic Tier is not uniformly done from one level to the other; i.e., from Foot to P-stem. In fact, such a mapping is done only with the metrical content of the N2. Then what about the metrical content of the N1? Given the descriptive observation and the visibility-based HDA, we can conclude that a unit of the Metrical Word level of the N1 is mapped to a P-stem unit.

Now we are ready to revisit the case of garasu-dama° considered in (43):
(53) Visibility-based HDA at Work in Japanese:
—Revised Structure of garasu-dama° ‘glass ball’ of (43)

On the one hand, the N2 -dama in (43) is the head of morpho-phonological structure, and therefore its foot-level unit is mapped to a P-stem unit of the Prosodic Tier. On the other hand, the N1 garasu- is the dependent and thus, due to the visibility-based HDA, we exhibit a mapping from a Metrical Word unit to a P-stem unit.

This revision of the analysis has virtually no effect on the CCPW, in that a long compound inevitably culminates at the extended PrWd regardless of the metrical content of the N1:

(54) Visibility-based HDA at Work in Japanese II: a case of long compound
surī- ‘chafing’ + garasu° ‘glass’ → surī-gārasu ‘frosted glass’

In the cases examined so far, the dependent in the compound is a single metrical word, consisting no more than three mora. Longer forms appear to be problematic: more than one metrical word is called for. In addition, the Metrical Word seems to violate the binarity requirement, which is strictly met in the other categories. This is clear from the
fact that in a short compound N1 has no effect on the accentuation, even if it is longer than five morae, such as airurando-go° ‘Irish (Gaelic) language’. If a unit of the Metrical Word level is constructed in binary fashion, like the other categories, then we would expect that the N1 airurándo ‘Ireland’, which consists of six morae, should construct at least two Metrical Word units, no matter how it is parsed, and thus should be realized accented, as shown in (55):32

(55)  **Metrical Word Is Not Binary: A case with super-long N1**
airurándo ‘Ireland’ + gó ‘language’ → airurando-go° ‘Irish (Gaelic) language’

The completely inert nature of the metrical content of the N1 suggests that Metrical Word is not created in binary fashion. It corresponds with the entire morphological root, suggesting an alignment constraint between a morphological stem and a metrical word.33 Therefore, the metrical structure in (56) represents a correct structure for the compound airurando-go° ‘Irish (Gaelic) language’, yielding to two P-stems in the prosodic tier:

---

32 The word airurando is parsed to satisfy syllabic integrity; thus both a and n are in the same foot, leaving the final foot of the word as a single mora. As mentioned in footnote 20, it is debatable where the syllable category falls in the structure, and how it interacts with the other metrical/prosodic categories. Note that the superlong status of the word airurando is not affected even if it is parsed without referring to the syllabic structure, creating three feet.

33 Alternatively we may conceive of the fact as the adjunction at the Metrical Word level, which still confirms the binarity requirement. I do not consider this alternative as it empirically is not distinguishable from the non-binary structure shown in (56).
(56) Metrical Word Is Not Binary II: A case with super-long N1
\[ \text{airurándo} \ ‘Ireland’ + \text{gó} \ ‘language’ \rightarrow \text{airurando-go}^\circ \ ‘Irish (Gaelic) language’ \]

The structure in (56) contrasts with the structures below for the compound \text{airurando-bíiru} ‘Irish beer’ with a superlong N1 \text{airurando-} and for \text{kan-bíiru} ‘canned beer’, with a short N1.

(57) N1 Doesn’t Matter When N2 Is Long:
   a. \text{airurándo} ‘Ireland’ + \text{bíiru} ‘beer’ \rightarrow \text{airurando-bíiru} ‘Irish (Gaelic) beer’

   b. \text{kán} ‘can’ + \text{bíiru} ‘beer’ \rightarrow \text{kan-bíiru} ‘canned beer’

What is important in the structures in (57) is that the result will not fundamentally differ no matter how long the N1 is. First, the N1 is recognized as one dependent Metrical Word
for the mapping, and thus it always yields to one and only one P-stem. Second, the length of the N1 doesn’t matter because the N2 always has enough material to create a PrWd, which in turn means that the compound is guaranteed to create an extended PrWd, and thus it is affected by the CCPW.

To summarize, what is most important is that an item in the N1 position of Japanese nominal compounds is parsed as one unit without consideration of the internal structure. Therefore, the analysis proposed in this section based on the notion of Head-dependent Asymmetry proposed by Dresher and van der Hulst (1998) predicts that a compound with a deaccenting N2 appears unaccented, no matter how long its N1 is: the phonological constituent of the N1 will simply be recognized as an insignificant chunk.

This analysis so far provides answers to the following questions: Why can’t long compounds be deaccenting? —Answer: Because they inevitably culminate at the extended PrWd, and thus they must obey the CCPW. Why in cases with deaccenting N2s does the structure of N1 not matter? —Answer: Japanese obeys a visibility-based Head-dependent Asymmetry and thus the metrical content of the N1 is parsed as one P-stem unit, regardless of its actual quantity.

3.3.1 Isomorphism between the Metrical and the Morphological Structures

So far, it has been assumed in this paper, without strong motivation, that the head in a morphological structure and the head of a phonological structure of a compound coincide. However, it has been proposed that these are not in fact isomorphic. This section shows that the analysis which we are pursuing seems to be in fact preferred. Alderete (2001:112–120) proposes an account of the short/long asymmetry that relies on a default-to-opposite-edge effect.34 He relies on the following constraints:

(58) \text{WORD-BIN}\text{Head} \iff The head PrWd of the prosodic compound must be binary; in effect, the PrWd prosodic head must be at least trimoraic.

\text{ALIGN-R-HD} \iff The PrWd head of a compound should be the second member.

\text{Ranking: \text{WORD-BIN}\text{Head} \succ \text{ALIGN-R-HD}} \quad (Alderete, 2001: 113–114)

The upshot of this analysis is that the phonological head of a compound is determined contextually, despite the fact that the N2 is always the morphological head of a compound. More precisely, when the N2 of a compound is long, so that it branches at the PrWd level, the N2 is the head of the compound, as shown in (59a), satisfying both \text{WORD-BIN}\text{Head} and \text{ALIGN-R-HD}. In this case, the N1 has no chance to be the head as \text{ALIGN-R-HD} always rules out such candidates. On the other hand, when the N2 is short, it violates \text{WORD-BIN}\text{Head}, and therefore the N1 appears to be the head, as shown in (59b):35

\[34\text{ The effect is exemplified with the data in (8). The effect, in summary, states that when a N2 is long the default accent falls in the left edge of the N2, whereas an accent falls in the right edge of the N1 when the N2 is short.}\]

\[35\text{ Note that Alderete (2001) assumes a unary prosodic structure where PrWd is immediately above Foot.}\]
Taking this analysis of prosodic structures of Japanese nominal compounds, Alderete argues that the ‘default-to-opposite-edge’ effect is a realization of the language’s desire to place an accent in the head. Aside from the fact that this dissociation between the morphological head and the phonological head is not of absolute necessity, as Kubozono (1995) and Tanaka (2001) offer analyses without it, the analysis seems to fail to capture the issues discussed in this paper. First, it has been established in this paper that there is an undominated requirement which forces a long compound to be accented. Under the view that the phonological head is determined separately, it is not clear how the N2 being the head when it is long (or the N1 being the head when the N2 is short) creates the effect of the CCPW argued for in this paper. What is more crucial is the treatment of short compounds, where, in fact, the phonological head may not necessarily be the N1. In Alderete’s analysis, short compounds with the identical N2 do not necessarily yield to a single analysis. Importantly, the status of the N1 decides the assignment of the phonological head in a compound. Consider the tableau in (60):

<table>
<thead>
<tr>
<th>N1Short + N2Short /</th>
<th>N1Long + N2Short /</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ N1Short + N2Short /</td>
<td>/ N1Long + N2Short /</td>
</tr>
</tbody>
</table>
| / | /
| → | →
| \ N1-Head \ N2 / | \ N1-Head \ N2 / |
| / \ N1-Head \ N2 / | / \ N1-Head \ N2 / |
| | |
| \ N1-Head \ N2 / | / \ N1-Head \ N2 / |
| / \ N1-Head \ N2 / | N1-Head \ N2 / |
| / \ N1-Head \ N2 / | N1-Head \ N2 / |

When the N1 is long, the N1 is realized as the phonological head of a compound, since it satisfies the higher-ranked WORD-BINHead, which essentially motivates a long member to be the head. When the N1 is short, on the other hand, both candidates—one considers the N2 head and the other the N1 head—are on a par with respect to WORD-BINHead, because both equally create violations and the candidates thus tie in this constraint. Thus, given that ALIGN-R-HD prefers to have the right-edge member as the phonological head, the N2 is realized as the phonological head in this case. This leads to a contradiction. As we have observed, aside from the 2+2 deaccentuation case discussed earlier—which itself is a more complicated issue than just short-versus-long—there is no clear instance where the N1 controls compound accentuation. For example, a compound with a deaccenting N2, such as tamá ‘ball’ or yamá ‘mountain’, is always deaccenting regardless of the metrical status of the N1; hence, ke-dama° ‘fur ball’, but also suisyou-dama° ‘crystal ball’. The compounds with N2 huda° ‘card, label’ below in (61) show cases which illustrate the contradiction with the analysis:
(61) *Compounds with Short N2 huda° ‘card, label’*

a. *mamorí ‘guarding’ + huda° ‘card, label’ → mamorí-huda ‘amulet’*  
   *máigo ‘lost child’ + huda° ‘card, label’ → maigó-huda ‘address card to prevent children from missing’*

b. *é ‘picture’ + huda° ‘card, label’ → é-huda ‘pictured card’*  
   *áká ‘red’ + huda° ‘card, label’ → a-ká-húda ‘red tag’*  
   *síti ‘pawn, pledge’ + huda° ‘card, label’ → síti-huda ‘pawn ticket’*  
   *móji ‘letter, character’ + huda° ‘card, label’ → moji-huda ‘card of letters (for playing cards)’*

Given the constraint system which Alderete proposes, the compounds with a long N1 in (61a) are considered to be left-headed compounds (cf., (60)). These examples are, according to the analysis, consistent with the fact that the accent falls in the right edge of the N1. The problem comes from the data in (61b). There, the compounds all have a short N1, and thus are considered as right-headed compounds. This means that in this situation, an accent should appear on the left edge of the N2. However, the data in (61b) show that either the output appears unaccented (perhaps due to the influence of 2+2 deaccentuation) or an accent falls in the right edge of the N1 even when the N1 is short. Crucially, we find no case where the accent falls on the initial syllable of the N2, which is contrary to what we expect from the analysis.

Also, Alderete’s analysis fails to capture the generalization we have come to in this paper, the CCPW. Recall that Alderete’s analysis considers the N2 to be the head when it is long, no matter how long the N1 is. However, right-headedness cannot reconcile with the CCPW. If we assume the CCPW and right-edge alignment, then a short compound with a short N1 (e.g., ke-dámá° ‘fur ball’) will be wrongly analyzed as requiring an accent. The problem comes from the fact that there is no way to come up with a natural class which consists only of long compounds.

The 2+2 deaccentuation cases also fall into this dilemma. Compounds with certain bimoraic N2s appear deaccented when N1 is also bimoraic (see examples in (17)). Notice that under Alderete’s approach, these compounds fall into the set of right-headed compounds, together with long compounds. This leaves us with an unexpected oddity. If Alderete’s analysis is on the right track, then we would find the context of 2+2 to be accenting, rather than deaccenting. Thus, it seems reasonable to conclude that assuming a dissociation between the phonological head and the morphological head, it is simply not possible to account for the short/long asymmetries in terms of (un)accentedness, and another account for the asymmetry is necessary. This suggests that the assumption may at best be redundant, violating the philosophical principle of Ockham’s razor.

### 3.3.2 Apparent Counterexample: 2+2 deaccentuation

Now let us consider two further questions: First, could there be compounds where the structure of N2 does not matter? And second, is the structure of N1 ever important? The theory argued for in this paper predicts that the answer to both questions is ‘no’.
However, there is one case in which the N1 seems to be important. We briefly consider this case in this section.

While the HDA analysis provides an elegant solution to a number of problems in Japanese, some phenomena seem to create problems: In particular, the 2+2 deaccentuation, described in Puzzle 3 of (15) and exemplified in (17), a part of which is reiterated in (62), presents a contradiction to the visibility-based HDA analysis of Japanese compounds:

(62) 2+2 Deaccentuation

a. i. pérusya ‘Persian’ + néko ‘cat’ → perusya-néko ‘Persian cat’
   ii. kúro ‘black’ + néko ‘cat’ → kuro-neko° ‘black cat’

b. i. maruta° ‘log’ + hasí ‘bridge’ → marutá-basi ‘log bridge’
   ii. isí ‘stone’ + hasí ‘bridge’ → isí-basi° ‘stone bridge’

Recall that this phenomenon is found when compounds with certain bimoraic N2s consist of four morae, preferably of four light syllables. Hence with a trimoraic N1 such as pérusya ‘Persian’ in (62a-i) a compound with the N2 néko ‘cat’ appears accented while with a bimoraic item, such as kúro ‘black’ in (62a-ii), a compound with the N2 néko appears unaccented as it meets the environment for the 2+2 deaccentuation. This condition means that the deaccentuation phenomenon is not conditioned by a superficial string of prosodic elements, but requires some reference to morphology. This can be seen by the fact that four mora outputs with a structure of 1μ+3μ or 3μ+1μ do not appear unaccented:

(63) Quadramoraic Sequence with non-2+2 Structure

a. ni ‘boiled’ + sakana° ‘fish’ → ni-zákana ‘boiled fish’

b. kagari° ‘lighting’ + hi ‘fire’ → kagari-bi ‘lighting fire/bonfire’

For now, we may conjecture that this phenomenon is due to the evenness of the prosodic structure; somehow the phonology wants to preserve the symmetric structure of a quadramoraic compound. Thus, the phenomenon points out to us that in order for phonology to be able to ‘know’ that a word like kuro-neko° consists of four light syllables, the prosodic structure of the N1 needs to be completely visible as well as that of N2.

Notice the visibility-based HDA argued for in this paper for the case of Japanese compounds does not imply that a dependent cannot have a structure, despite its name. The inner structure of N1 is present and is visible in the metrical structure. Of course, a native speaker of Japanese would be able to count how many morae are found in the N1 sequence arumi- in the compound arumi-kan° ‘aluminum can’, and it is very hard to imagine that a native speaker of Ligurian Italian is incapable of telling how many syllables are in the sequence la-rivoluzióne ‘the revolution’ once the word is placed in a non-final position. Thus, in such case, a dependent structure is fully analyzable for the metrical computation.

In any case, we must assume that the structure is visible when the N1 is short, and as a consequence, the phonology can detect the correct environment for the 2+2 deaccentuation. Thus we can conclude that the structure of the compound kuro-neko° looks like the following:
An upshot of this is that there is nothing in the proposed analysis to modify or add to account for the 2+2 deaccentuation. The foot constructed in the N2 maps to one P-stem in the prosodic tier, and the metrical word in the N1 also maps to a P-stem, which is vacuously observed since the metrical word of N1 is constructed from a single foot. The phonology sees that the metrical structure of the compound *kuro-neko* consists of two bimoraic feet, and therefore it meets the context where the 2+2 deaccentuation applies.\(^{36}\) This contrasts to the following structure:

The example *perusya-néko* ‘Persian cat’ used in (65) does not meet the structural description of the 2+2 deaccentuation because the N1 *perusya-* is trimoraic. Notice that both *perusya-néko* ‘Persian cat’ and *kuro-neko* ‘black cat’ create two P-stems. The distinction stems from the difference in the Metrical Structure; in (65), the structure is clearly uneven, with N1 consisting of two feet.

To summarize, although there is no conclusive analysis for the 2+2 deaccentuation, we can state the following: 2+2 cases form a subset of short compounds,
confirming that they may be unaccented. It does not go against the notion of visibility-based HDA that the 2+2 deaccentuation needs to see the internal metrical structures of both N1 and N2; this structure is visible but is, in general, simply ignored.

3.4 Implications and Residual Issues

The analysis which I propose has a number of testable implications, and thus the claim is falsifiable. In this subsection we will consider two of such implications; **diachronic drift**, and cases with **complex short N2s**.

3.4.1 Diachronic Drift

Let us first consider what I call *diachronic drift*. In the case of Japanese, it has been widely observed that the language is undergoing an ongoing change from *accented* to *unaccented* (Tanaka, 2005:121, 190–198), with unaccented forms becoming more and more predominant. Thus, it has been widely noticed that recent loanwords from Western words (mainly from English) are initially introduced into the Japanese lexicon with an accent, but the loanwords start to lose their accent as time goes by.

(66) **Example of Drift** (Tanaka 2005:121)

a. *báiku / baiku* ‘(motor)bike’
   
b. i. *kúrabu* ‘extracurricular activity club’ / *kurabu°* ‘nightclub’
   
   ii. *peeji°* ‘page’

Thus, some words are allowed to have accented and unaccented synchronic variants for a time. Such a general movement from “accented” to “unaccented” has been noticed in terms of sociolinguistic change which often is attributed to frequency according to Inoue (1998: 167ff). Inoue makes a statistical observation that a word is more likely to be pronounced with no accent when the speaker is familiar with the concept of the word, and he introduces the term *senmonka akusento* (or, *specialist accent*). For example, Inoue (1998: 171–172) reports that university students whose hobbies include cars and motor bikes are more likely to produce or accept unaccented forms of *báiku°* ‘bike’, *hooiru°* ‘wheel’, and *mahuraa°* ‘muffler’, than students who are not interested in them. Tanaka (2005) makes an interesting statement that the accent change in the opposite direction from *unaccented* to *accented* is non-existent, or at least extremely rare, and he tries to capture this drift by postulating a markedness-based deaccenting constraint.

If the analysis pursued in this paper is on the right track, we would expect a higher rate of this gradual loss of accent among *short* compounds than among *long* ones. The logic of this is that for the long compounds we have argued that the CCPW is undominated in the ranking of constraints for Japanese phonology. I also agree with Tanaka’s (2005) account about directionality of accent change under the assumptions of

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37 Here the term *drift* is used in the sense of Sapir (1921: ch. 7) (More precisely, what he calls ‘slope’ of drift), and it roughly means a general slow unidirectional change of a language from one state to another.

38 How loanwords obtain accent at all is an interesting question, and suggests that the language seems to have two opposing types of mechanisms at play, one introducing ‘default’ accent, and the other deleting accent. Shinohara (2000) shows how French loanwords are adapted into Japanese in terms of accent.
the current OT-type framework. That is, an OT analysis of the drift requires a constraint to reflect the effect of the deaccentuation, and the drift is explained in terms of demotion of an accent-motivating constraint antagonistic to the deaccenting constraint. This is illustrated in (67) below, where ACC is the accent-motivating constraint and DEACC is the deaccenting constraint:

(67) **Representing the Drift:**

<table>
<thead>
<tr>
<th></th>
<th>ACC</th>
<th>DEACC</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>accent</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>unacc’ed</td>
<td>*</td>
</tr>
<tr>
<td>b.</td>
<td>accent</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>unacc’ed</td>
<td>*</td>
</tr>
<tr>
<td>c.</td>
<td>DEACC</td>
<td>ACC</td>
</tr>
</tbody>
</table>

The tableau in (67a) shows the case of a loan word recently introduced into the Japanese lexicon. The fact that the accented variant is strongly preferred to the unaccented one is captured by providing ACC ranked above DEACC. However, the dominance of ACC becomes less stable as time passes, and at one point ACC is placed equal with DEACC, as shown in (67b). The ‘co-ranking’ of the two antagonistic constraints makes both the accented and the unaccented candidates optimal. At this point, we can think of two possibilities. One is that if a loan word with variable forms is polysemic or homophonous, both variants may survive with reassignment of more specific meanings, as exhibited in (66b-i). The other possibility is that a variant without an accent becomes the preferred variant of the language, and the accented variant gradually becomes unacceptable, as the case in (66b-ii). This is explained in terms of demotion of ACC, illustrated in (67c). This analysis based on demotion of an accenting constraint provides us an explanation for why we do not see a case where an accented form survives after the accented/unaccented optionality start to emerge. Since the constraint which causes deaccentuation drift is not of a rigid kind in the phonological system of Japanese—otherwise words simply enter into the change without any reliance on frequency—it should be at least ranked quite low in the ranking system, perhaps with some “probabilistic” nature.

What is crucial to the analysis I am arguing for in this paper is that, by definition, the drift-inducing deaccenting constraint and the CCPW militate against each other; the CCPW promotes an accented candidate for long compounds, whereas the deaccenting constraint disfavours one, and the effect of CCPW is absent in short compounds. Thus, the analysis predicts that long compounds should remain accented under the shadow of the undominated CCPW, while short compounds will be affected by the constraint motivating the drift, as they have nothing to do with the CCPW.

This prediction further implies that given two compounds with an identical superficial string, a compound with a short N2 is more likely to follow the drift than the counterpart with a long N2. For instance, in the following pairs of compounds in (68), the ones in the left column should be more likely to be affected by the drift than the ones in the right column:

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39 However, I consider problematic Tanaka’s view that this deaccentuation effect is due to a markedness effect, as well as the implementation of this idea. This is discussed in detail in Oda (2005). Also a question remains with this demotion-based analysis—why are new loan words still introduced into Japanese lexicon with an accent at all?
(68) **Potential Drifters**

a. More likely to undergo drift
   i. *kagarí-bi* ‘bonfire’ \([3\mu+1\mu]\)
   ii. *niwaká-ame* ‘unexpected shower’ \([3\mu+2\mu]\)

b. Less likely to undergo drift
   i. *ni-zákana* ‘boiled fish’ \([1\mu+3\mu]\)
   ii. *mini-báiku* ‘mini-bike’ \([2\mu+3\mu]\)

Also, a compound consisting of three or fewer morae are more likely to undergo the drift, given that they are always short compounds. These predictions are interesting, but at the same time they take us beyond the scope of this work.

### 3.4.2 Complex Short N2

Notice that the structural analysis proposed in this paper has consequences for morphologically complex cases. In this section, we consider one fragment: compounds with a complex short N2.

McCawley (1968:162) observes that “if the [N2] of a compound itself is a compound, it will receive an accent regardless of how many moras it contains, be it 2, 3, or 4.”

The diagram in (69) below schematizes McCawley’s finding:

(69) **McCawley’s Observation**

Given any prosodically well-formed structure \(\alpha\), \(\alpha\) always appears accented if it meets the following context (Greek letters indicate some metrical categories):

\[ \begin{array}{c}
\text{M} \\
\beta \\
\cdots \\
\alpha \\
\cdots \\
\chi \\
\cdots \\
M \text{ COMP-HD} \\
M \text{ COMP-HD} \\
M \text{ COMP} \\
\end{array} \]

What is crucial to us is that once this environment is met, we do not need to consider

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\[ \text{Note that this statement is not entirely accurate, as a compound with a morphologically complex N2 may appear unaccented when the N2 is super-long, containing five or more morae, and also originally unaccented:} \]

i) *nise* ‘fake’ + *garasu-dama* ‘glass ball (cf., (43) and (53)) → nise-garasu-dama* ‘fake glass ball’

ii) *nise* ‘fake’ + *ke-dama* ‘fur ball’ → nise-ké-dama ‘fake fur ball’

As we consider super-long words to be beyond the scope of this paper, we do not have any solution to a case of this type.
whether the N2 is short or long, since the entire structure will appear accented. Thus, we can restate McCawley’s observation as follow: complex N2s are treated as if they are long. When a complex N2 has three or more morae, this statement is redundant, since they are already long, and hence they will induce an accent to obey the requirement imposed by the CCPW. What is crucial to us is McCawley’s statement that even a bimoraic N2 can act like a long N2, when it is morphologically complex. This apparent peculiarity is, in fact, exactly what we expect from the prosodic analysis argued in this paper.

Here is the logic: A short word consists of either one or two morae. Under a natural assumption that a compound with phonologically covert items is nonexistent, we expect the intersection of monomoraic items and compounds to be null. Thus, a short complex compound inevitably is always minimally bimoraic, with the form of $[1\mu+1\mu]$. This type of word is often found with Sino-Japanese bound stems.

(70) **Example of Complex Short Compound:**

a. $syu$ (主) ‘main’ + $gi$ (義) ‘morals, meaning’  
   → $syú-gi$ (主義) ‘doctrine’

b. $ki$ (汽) ‘steam’ + $sya$ (車) ‘car, vehicle’  
   → $ki-sya$ (汽車) ‘steam locomotive’

c. $só$ (祖) ‘ancestor’ + $gó$ (語) ‘word/language’  
   → $só-go$ (祖語) ‘parent language’

d. $gun-koku$ ‘militaristic nation’ + $syú$-gi ‘doctrine’  
   → $gunkoku-syúgi$ ‘militarism’

e. $góu-ri$ ‘rationality’ + $syú$-gi ‘doctrine’  
   → $gouri-syúgi$ ‘rationalism’

f. $kyou-san$ ‘co-production’ + $syú$-gi ‘doctrine’  
   → $kyousan-syúgi$ ‘communism’

g. $yó$ ‘night’ + $ki-sya$ ‘locomotive’  
   → $yó-gisyá$ ‘night train’

h. $in’ou$ ‘Indo-European’ + $só$-go ‘parent language’  
   → $in’ou-sógo$ ‘Proto I-E’

Under our analysis, a *short* compound culminates at the core PrWd level (cf., (39)), and hence a short complex word should have the following structure:

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41 It is impossible to tell whether these stems are accented in isolation, as many of them are bound morphemes.

42 The apostrophe in *in’ou* ‘Indo-European’ indicates that the nasal is a *moraic nasal*, a coda of the preceding vowel, but not an onset of the following vowel.
If this structural analysis is carried out to a further step of compound formation, a compound with a complex N2 inevitably always culminates at the extended PrWd, as in (72).

(72) Structure with Complex Short N2:

Hence, a compound with a complex N2 must always surface accented to obey the CCPW constraint, regardless of the length status of the N2.

4. Summary and Conclusion

This paper has argued that the apparent asymmetry between short and long N2 observed in Japanese nominal compounds boils down to a simple prosodic requirement imposed upon a certain prosodic structure; the CCPW. As a result, the requirement demands a long compound to always appear accented, and thus we find no long deaccenting N2 in the language.

The fact that the prosodic status of the N1 is always irrelevant to the short/long distinction of a compound apparently goes against the prosodic analysis of compound. However, we argue that the analysis is still viable, as such insignificance is in fact what we expect given the notion of Head-Dependent Asymmetry (Dresher and van der Hulst, 1998). That is, the asymmetry of visibility is active in Japanese prosodic phonology in that the N1 becomes invisible to phonology unless it is less complex than the N2. Several empirical implications are brought from this analysis: deaccentuation as a diachronic drift, and compounds with a complex short N2.

References


